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## Liphistiid Spiders (Araneae, Mesothelae) from Central and Eastern Thailand<sup>1)</sup>

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**Abstract** Three new liphistiid spiders, *Liphistius ornatus*, *L. owadai* and *L. ochraceus*, are described from the provinces Chantaburi, Loei and Phitsanulok, Thailand. *Liphistius ornatus* sp. nov. and *L. owadai* sp. nov. are closely related not only to each other but also to *L. desultor* SCHIÖDTE, 1849, from northern Malaysia and *L. bicoloripes* ONO, 1988, from southern Thailand. These four species were found at lower altitudes and their females have orange-coloured femora and carapace. *Liphistius ochraceus* sp. nov. resembles the dull-coloured species from the mountainous areas of northwestern Thailand and eastern Burma and appears closest to *L. yamasakii* ONO, 1988. Biological information about *L. ornatus* sp. nov. is given.

Since BRISTOWE (1975) discovered *Liphistius* in Thailand, eight species of the genus have become known from this country (PLATNICK & SEDGWICK, 1984; ONO, 1988 a, b; SEDGWICK & SCHWENDINGER, 1990), and besides, three others will be described shortly (SCHWENDINGER, in press). Most of them were found in the northern, northwestern and southern parts of Thailand, whereas from the central part only a single cave-dwelling species, *L. tham* SEDGWICK et SCHWENDINGER, 1990, was previously discovered.

In the present paper, three additional *Liphistius* species are described from central and eastern Thailand on the basis of the specimens collected from the provinces Chantaburi, Loei and Phitsanulok. The spiders were discovered independently by ONO during a zoological expedition made by the Thailand Institute of Scientific and Technological Research, Bangkok, and the National Science Museum, Tokyo, and by SCHWENDINGER in the course of research work at Chiang Mai University. Having exchanged preliminary results, we recognized that our liphistiid specimens are of

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striking resemblance in general appearance as well as in genitalic features. This urged us to work up the available material and data from this region in co-operation.

Abbreviations used in this text are as follows: AME, ALE, PME, PLE, anterior (posterior) median (lateral) eyes; MOQ, median ocular quadrangle; AMNH, American Museum of Natural History, New York; MHNG, Muséum d'Histoire Naturelle, Genève; MNHW, Naturhistorisches Museum, Wien; NSMT, National Science Museum (Nat. Hist.), Tokyo. Terminology of genitalic characters is according to HAUPT (1983) and PLATNICK and SEDGWICK (1984). All measurements, if not otherwise indicated, are in mm.

*Liphistius ornatus* sp. nov.

(Figs. 1–8)

*Material examined.* Type series. Holotype: ♂ (moulted on 10–V–1987, matured on 9–X–1987; MHNG); paratypes: 1 ♂ (moulted on 9–V–1987 and 20–IX–1988, matured on 8–I–1989), 6 ♀♀ (moulted on 13–XI–1987/18–IV, 20–VIII, 29–X–1988, 24–II, 1–VII–1989/29–IX–1987, 14–V, 29–X–1988, 19–X–1989 respectively), Khao Soi Dao Wildlife Sanctuary, 300–400 m alt., Chanthaburi Province, Thailand, P. J. SCHWENDINGER leg., 9–V–1987 (AMNH, MHNG, NHMW).

*Diagnosis.* *Liphistius ornatus* sp. nov. resembles *L. desultor* in size, colouration and in male genitalic characters. However, its bulb differs in a more pronounced contrategulum, in smaller bristles widely spaced on cumulus, and in the patch of spines on paracymbium encircled by a light band (Figs. 1–2; cf. PLATNICK & SEDGWICK, 1984, figs. 45–49). The vulva resembles that of *L. bicoloripes* but has a shorter, narrower and more pointed basal stalk and lacks hairs on the lateral margin of the genital atrium. Pore-plate with thickened lateral margins bearing small lobes (Figs. 3–6; cf. ONO, 1988 b, figs. 5–6). Close relationship with *L. owadai* sp. nov. is apparent.

*Description.* Male (holotype). Measurements. Total length 24.8 (without chelicerae, 21.6); carapace 11.6 long, 10.3 wide; abdomen 9.3 long, 6.5 wide. Ocular tubercle 1.64 long, 1.71 wide; eye sizes and interdistances: AME 0.20, ALE 1.03, PME 0.47, PLE 0.90, AME–AME 0.14, AME–ALE 0.28, PME–PME 0.12, PME–PLE 0.19, ALE–PLE 0.22, MOQ 0.75 long, anterior width 0.55, posterior width 0.94. Sternum 5.0 long, 3.1 (1.4 on ventral surface) wide; labium 1.2 long, 2.2 wide. Leg and palp measurements are given in Table 1.

Chelicerae with 11/12 (left/right) teeth on promargin of fang furrow. Paired tarsal claws of legs with 3–4 teeth, unpaired claws with 0–1 denticles.

Male palp (Figs. 1–2, 7–8). Bulb characterized by detached embolic parts, the sclerotized part strengthened by 2 longitudinal ridges that reach the tip (cf. SCHWENDINGER, in press); proximal edge of embolus projecting into a scale-like plate. Tegulum and subtegulum without apophysis; contrategulum large and coarsely notched. Patch of spines on paracymbium bordered by a pallid band. Short black bristles scattered on low cumulus, hardly distinguishable from other bristles

on paracymbium. Tibial apophysis with 4–5 long, slender spines.

Colouration (alive). Uniformly dull black, except for dark brown abdomen and pale patches lateral of dark brown abdominal tergites mottled with light brown. Abdominal sternites, proximal chelicerae, anterior labium, and anterior maxillae dark orange.

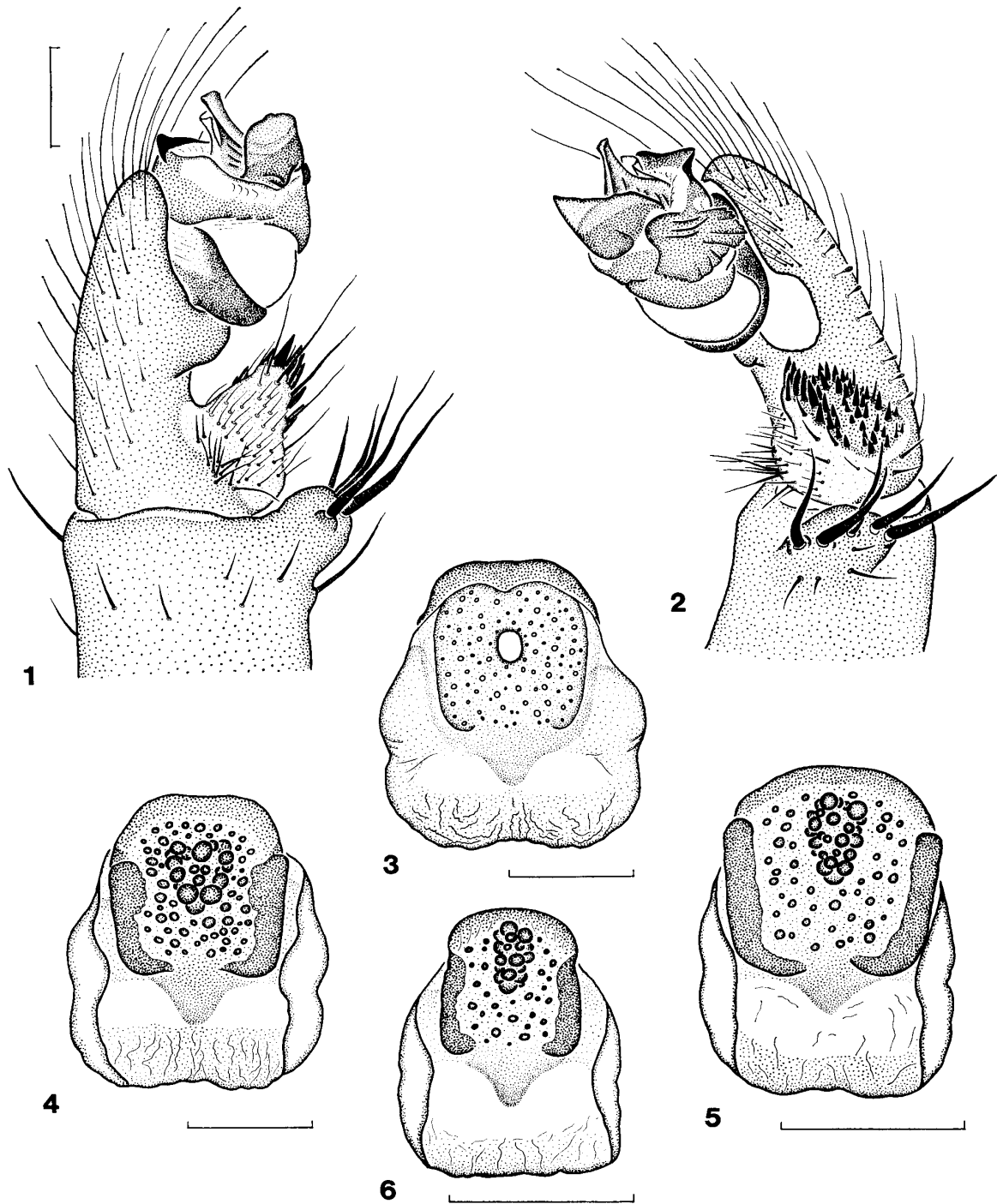
Female. As in the male, except for the following. Total length 24.5 (without chelicerae 21.4), carapace 11.1 long, 9.2 wide, abdomen 9.0 long, 8.9 wide, covered with strong black bristles in its posterior half. Ocular tubercle 1.33 long, 1.46 wide; eye sizes and interdistances: AME 0.17, ALE 0.79, PME 0.44, PLE 0.75, AME–AME 0.08, AME–ALE 0.26, PME–PME 0.12, PME–PLE 0.16, ALE–PLE 0.19, MOQ 0.62 long, anterior width 0.42, posterior width 0.87. Sternum 5.0 long, 3.2 (2.1 on ventral surface) wide; labium 1.2 long, 2.6 wide. Leg and palp measurements as in Table 1.

Chelicerae with 11/11 teeth on promargin of fang furrow. Paired tarsal claws of legs with 2–3 teeth, unpaired claws with 0–2 denticles; palpal claw with 2–3 denticles.

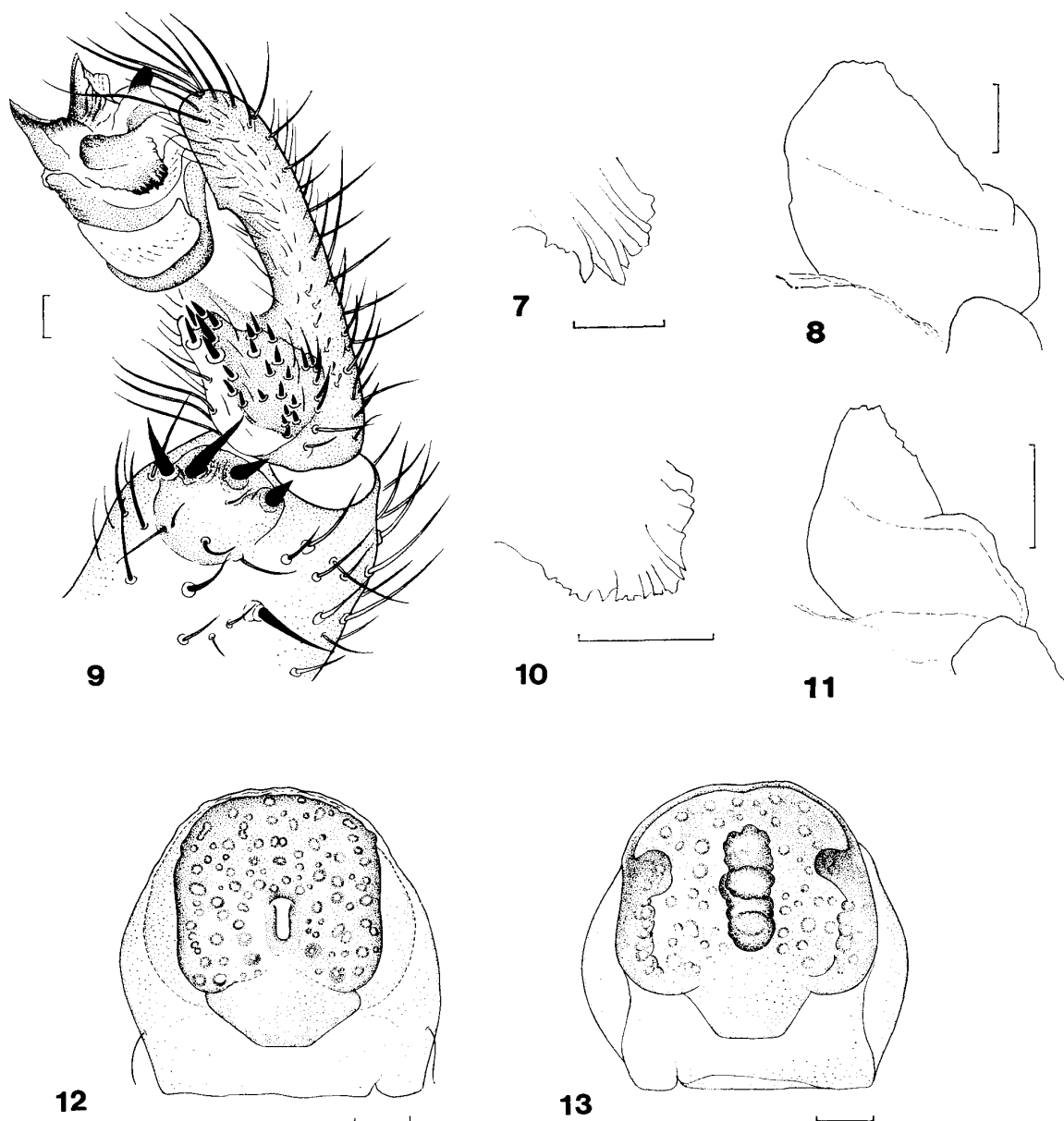
Female genitalia (Figs. 3–6). Vulva with narrow, V-shaped posterior stalk, connected to the sidepieces of the genital atrium (without hairs) by a lightly pigmented area. Pore-plate as long as, or longer than wide, its lateral margins strongly thickened, terminating into small anterolateral lobes. Anterior margin of pore-plate procurved, only slightly thickened. Receptacular cluster well developed and in an anterior position.

Table 1. Palp and leg measurements (length) taken from the *Liphistius* specimens described in this paper.

		♀					♂				
		Palp	Leg I	II	III	IV	Palp	Leg I	II	III	IV
<i>L. ornatus</i> sp. nov.:	Femur	6.1	6.8	7.0	7.2	9.6	5.7	9.4	9.4	9.6	12.0
	Patella	3.7	4.3	4.3	4.5	5.3	3.7	4.8	4.8	4.9	5.6
	Tibia	4.7	4.7	4.7	4.9	6.8	6.6	6.5	6.7	7.2	9.2
	Metatarsus	—	4.5	4.8	5.8	9.4	—	8.1	8.7	10.3	13.7
	Tarsus	4.4	2.3	2.3	2.8	4.0	3.5	4.0	4.0	4.5	5.2
	Total	18.9	22.6	23.1	25.2	35.1	19.5	32.8	33.6	36.5	45.7
<i>L. owadai</i> sp. nov.:	Femur	4.8	5.6	5.4	5.6	7.7	4.0	6.4	5.7	6.4	7.8
	Patella	2.8	3.0	3.1	3.0	3.0	2.2	3.0	3.0	3.0	3.1
	Tibia	3.1	3.4	3.3	3.5	5.2	4.1	4.6	4.7	5.4	6.6
	Metatarsus	—	3.1	3.5	4.0	6.9	—	5.4	6.1	7.3	9.9
	Tarsus	3.2	1.5	1.8	1.9	2.8	2.3	2.3	2.5	3.0	3.7
	Total	13.9	16.6	17.1	18.0	25.6	12.6	21.7	22.0	25.1	31.1
<i>L. ochraceus</i> sp. nov.:	Femur	3.5	4.1	4.1	4.1	5.3	unknown				
	Patella	1.8	2.1	2.1	2.0	2.3					
	Tibia	2.3	2.4	2.5	2.6	4.0					
	Metatarsus	—	2.3	2.4	3.1	6.4					
	Tarsus	2.3	1.2	1.4	1.7	2.3					
	Total	9.9	12.1	12.5	13.5	20.3					



Figs. 1–6. *Liphistius ornatus* sp. nov. — 1. Male palp of the holotype, ventral view. 2. The same, retroventral view. 3–6. Genitalia of three females. 3, Dorsal view; 4–6, ventral view. (Scales: 1.0 mm.)



Figs. 7–13. 7–8, *Liphistius ornatus* sp. nov.; 9–13, *L. owadai* sp. nov. — 7, 10. Dentated ledge of contrategulum. 8, 11. Proximal edge of embolus, prolateral view. 9. Male palp, retroventral view. 12. Female genitalia, dorsal view. 13. The same, ventral view. (Scales: 0.25 mm.)

Colouration (alive). Carapace orange, with a dark brown band at lateral and anterior margins, including eye group, and with a dark pattern behind eye tubercle and coxal elevations. Femora pale orange, distal leg segments dull black.

*Variation.* The second male measures: carapace length 11.2, width 9.9; some tibio-metatarsal proprioceptors (*sensu* PLATNICK & GOLOBOFF, 1985) remain on its

anterior legs. The largest female has carapace length 14.2, width 12.7. Very young spiderlings are uniformly brown, with annulated legs, and gain light orange femora when reaching carapace length 6.8, width 5.6. In large females the carapace becomes increasingly darker on pars thoracica, only pars cephalica remains orange. Immature males show the coloration of females until the final moult. Variation of female genitalia as shown in Figs. 4–6.

*Range.* Known only from the type locality.

*Etymology.* The specific epithet (Latin: *ornatus*=decorated) refers to the conspicuous colouration of females.

*Natural history.* Habitat and burrow. The spiders occur on temporarily shaded, vertical path cuts, in semi-evergreen rain forest. Burrows were up to 29 cm long and 2.7 cm in diameter (in male two instars prior to maturity 17 and 2.4 cm respectively), closed by a trap-door up to 3.6 cm long, 5.3 cm wide (in immature male 2.8 and 4.8 cm), furnished with 5–8 signal threads up to 8 cm long. The largest female had an empty egg sac stored in the 5.7 cm wide terminal chamber of the burrow. The egg sac 3.8 cm long, 4.1 cm wide, 2.3 cm high, 0.4 cm thick at the top, 0.7 cm at the sides and 0.5 cm at the bottom, contained 415 larval skins and 10 dried up eggs. The cover plate of the egg sac was perforated by three small holes, through which the spiderlings apparently had emerged. In the immediate surroundings (about 1 m<sup>2</sup>) of this female 7 small burrows, with trap-door width 1.0 cm, were seen. They presumably were built by the offspring of that year. Juveniles construct exceptionally large doors compared with other *Liphistius* species of similar size.

*Annual cycle.* One male (reared in Chiang Mai) matured in October. This probably accords with natural conditions, whereas maturation of the other male in January was possibly caused by rearing in Austria. The offspring had dispersed before May. Hence, mating presumably takes place in October and November, as in the species of northern Thailand and Burma (SCHWENDINGER 1988; SCHWENDINGER, in press). Egg development apparently comes to an end before May, which is earlier than in the spiders of the north. The female taken with an egg sac subsequently moulted in September.

*Behaviour.* As in other large species *L. ornatus* sp. nov. threatens by raising the body on its legs, while opening the chelicerae widely. When placed in contact with a female, males displayed courtship behaviour by palpitating the female prosoma with their first pair of legs, pausing, and 3–4 times jerking both palps upward synchronously. A final quiver of the entire body terminated that timid approach; they did not copulate. Mating behaviour as in *L. bristowei* PLATNICK et SEDGWICK, 1984, is indicated (SCHWENDINGER, in press).

### *Liphistius owadai* sp. nov.

(Figs. 9–14)

*Material examined.* Type series. Holotype: ♂, allotype: ♀ and 1 ♂ paratype,

Thung Salaeng Luang, 550 m alt., Phitsanulok Province, Thailand, 24–25–VIII–1987, H. ONO leg. (NSMT–Ar 1880–1882).

*Diagnosis.* This species resembles *Liphistius desultor*, *L. bicoloripes* and *L. ornatus* sp. nov. in general appearance; all these species have orange-coloured femora and carapace in females. It seems most closely related to *L. ornatus* sp. nov. but differs in smaller size, in light leg patellae and in uniformly brown abdominal tergites, furnished with smaller spines. Though very similar in shape, male and female genitalia differ in the following points. Male palp: Spines on tibial apophysis shorter and not so strongly tapering; paracymbium armed with fewer spines; cumulus with stronger, more regularly arranged bristles; dentated ledge of contrategulum less projecting sideways and more strongly pigmented terminally; small tegular apophysis present; scale-like plate on proximal edge of embolus narrower (Figs. 9–11, cf. Figs. 1–2, 7–8). Female genitalia: Pore-plate and posterior stalk clearly wider than those of *L. ornatus* sp. nov.; dorsal opening of receptacular cluster on the pore-plate situated more posteriorly; lateral lobes of pore-plate larger (Figs. 12–13, cf. Figs. 3–6).

*Description.* Male (holotype). Measurements. Total length 14.0; carapace 6.7 long, 6.5 wide; abdomen 7.4 long, 6.4 wide. Ocular tubercle 1.05 long, 1.13 wide; eye sizes and interdistances: AME 0.10, ALE 0.65, PME 0.38, PLE 0.60, AME–AME



Fig. 14. *Liphistius owadai* sp. nov., female. (Scale in mm.)

0.13, AME–ALE 0.18, PME–PME 0.11, PME–PLE 0.11, ALE–PLE 0.10, ALE–ALE 0.10, PLE–PLE 0.31, MOQ 0.50 long, anterior width 0.33, posterior width 0.68. Sternum 2.0 long, 1.7 wide; labium 0.6 long, 1.2 wide. Leg measurements as given in Table 1.

Chelicerae with 10 teeth on promargin of fang furrow. Paired tarsal claws of legs with 2–4 teeth, unpaired ones without distinct denticles.

Male palp (Figs. 9–11). Tibial apophysis with 4–5 strong spines on subterminal ledge. Cumulus not elevated, furnished with strong and regularly arranged bristles. Contrategulum with wide dentated ledge. Tegulum with a small process on distal edge; subtegular apophysis absent. Embolic parts detached; two ridges reach the tip of the sclerotized part.

Colouration (in spiritus). Carapace light chestnut-brown, chelicerae darker, labium and sternum yellowish brown, legs and palps chestnut-brown without annulations. Abdomen dark grey, mottled with brown, ventral side light beige; tergites uniformly dark brown, their posterior margin white.

Female (allotype). Measurements. Total length 17.5, carapace 8.1 long, 6.9 wide; abdomen 9.0 long, 7.2 wide. Ocular tubercle 1.08 long, 1.23 wide; eye sizes and interdistances: AME 0.13, ALE 0.63, PME 0.38, PLE 0.50, AME–AME 0.13, AME–ALE 0.18, PME–PME 0.13, PME–PLE 0.13, ALE–PLE 0.10, ALE–ALE 0.15, PLE–PLE 0.43, MOQ 0.45 long, anterior width 0.28, posterior width 0.55. Sternum 4.0 long, 2.4 wide; labium 0.9 long, 1.7 wide.

Chelicerae with 12 teeth on promargin of fang furrow. Paired tarsal claws of legs with 2–4 teeth, unpaired ones unarmed; claw of palpal tarsus with 2 denticles.

Female genitalia (Figs. 12–13). Anterodorsal pore-plate almost square, with two strong lateral lobes on ventral surface. Spermatheca large, not racemose. Posterior stalk truncate.

Colouration (in spiritus). Carapace dark yellow with blackish brown markings, anterior and lateral margins blackish brown. Chelicerae, sternum and labium dark yellow; tarsi of palps, tarsi and metatarsi of legs black, their other parts yellow. Abdomen light beige and mottled with blackish brown; tergites blackish brown with lighter markings.

*Variation.* The male paratype measures: total length 13.4, carapace 6.4 long, 5.4 wide, abdomen 6.9 long, 5.3 wide; colouration lighter than in the holotype. As in *L. ornatus* sp. nov., the number of spines on the tibial apophysis of the male palp is variable and may differ even between the left and right palp of the same individual.

*Range.* Known only from the type locality.

*Etymology.* This new species is named after Dr. Mamoru OWADA, National Science Museum, Tokyo, who felt a high fever for ten days after numerous bites of *Aedes* mosquitoes during the research at Thung Salaeng Luang.

*Liphistius ochraceus* sp. nov.

(Figs. 15–16)

**Material examined.** Type series. Holotype: ♀ and paratypes: 4 ♀♀, Phu Rua National Park, 1,200 m alt., Loei Province, Thailand, 21–VIII–1987, H. ONO leg. (NSMT–Ar 1883–1887). Other specimens examined. 2 juv., same data as for the holotype; 2 ♀♀, Phu Hin Rongkla, 1,200 m alt., Nakhon Thai District, Phitsanulok Province, Thailand, 27–VIII–1987, H. ONO leg. (NSMT–Ar 1888–1890).

**Diagnosis.** This species resembles *L. bristowei* and *L. yamasakii* from northern Thailand. They all are dark-coloured and have wide pore-plates with thickened anterior and lateral margins. *Liphistius ochraceus* sp. nov., however, is distinguished from these two species in the shape of its spermatheca and in its narrow posterior stalk (Figs. 15–16; cf. ONO, 1988 a: figs. 2–3, 6–7).

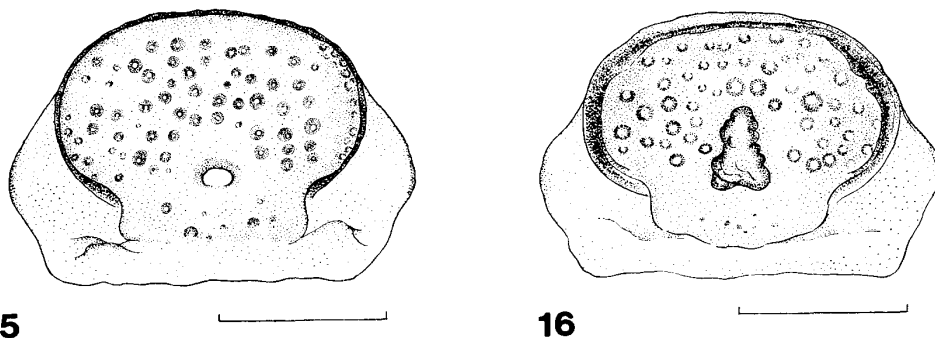
**Description.** Female (holotype). Measurements. Total length 11.1; carapace 5.0 long, 4.3 wide; abdomen 6.4 long, 5.0 wide. Ocular tubercle 0.80 long, 0.88 wide; eye sizes and interdistances: AME 0.05, ALE 0.55, PME 0.33, PLE 0.45; AME–AME 0.05, AME–ALE 0.20, PME–PME 0.08, PME–PLE 0.10, ALE–PLE 0.13, ALE–ALE 0.13, PLE–PLE 0.35; MOQ 0.55 long, anterior width 0.15, posterior width 0.55. Sternum 2.8 long, 1.9 wide; labium 0.6 long, 1.4 wide. Leg measurements, see Table 1.

Chelicerae with 11/12 (left/right) teeth on promargin of fang furrow. Paired tarsal claws of legs with 3–4 teeth, unpaired ones with 2–4 denticles; claw of palpal tarsus with 5 denticles.

Female genitalia (Figs. 15–16). Anterodorsal pore-plate oval, much wider than long, with thickened anterior and lateral margins. Gland pores small; spermathecae not racemose. Posterior stalk short and broadly truncate, with indistinct pores.

Colouration (in spiritus). Carapace light brown, its anterior margin darker; chelicerae reddish brown; labium, sternum, legs and palps yellowish brown; legs not annulated. Abdomen beige, mottled with brown; tergites darker.

**Variation.** Body length ranges 7.9–12.4; colouration beige to light brown.



Figs. 15–16. *Liphistius ochraceus* sp. nov. — 15. Female genitalia, dorsal view. 16. The same, ventral view. (Scales: 0.5 mm.)

*Range.* Known from two localities in Loei and Phitsanulok Provinces at the boundary area between central and northeastern Thailand.

*Etymology.* The specific name refers to the obscure body colouration.

*Remark.* Male unknown.

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### References

- BRISTOWE, W. S., 1975. An interesting spider found in Thailand. *Nat. Hist. Bull. Siam Soc., Bangkok*, **26**: 166–167.
- HAUPT, J., 1983. Vergleichende Morphologie der Genitalorgane und Phylogenie der liphistiomorphen Webspinnen (Araneae: Mesothelae). I. Revision der bisher bekannten Arten. *Z. zool. Syst. Evolut.-forsch.*, **21**: 275–293.
- ONO, H., 1988 a. Liphistiid spiders (Araneae, Mesothelae) of Northwest Thailand. *Bull. natn. Sci. Mus., Tokyo*, (A), **14**: 35–41.
- 1988 b. Liphistiid spiders (Araneae, Mesothelae) of South Thailand. *Ibid.*, (A), **14**: 145–150.
- PLATNICK, N. I., & P. A. GOLOBOFF, 1985. On the monophyly of the spider suborder Mesothelae (Arachnida: Araneae). *J. New York Ent. Soc.*, **93**: 1265–1270.
- & W. C. SEDGWICK, 1984. A revision of the spider genus *Liphistius* (Araneae, Mesothelae). *Amer. Mus. Novit.*, (2781): 1–31.
- SCHWENDINGER, P. J., 1988. Biological observations on orthognathous spiders in northern Thailand (Araneae: Mesothelae, Mygalomorphae). In: *11. Europäisches Arachnologisches Colloquium. TUB-Dokument. Kongr. Tag., Berlin*, **38**: 231–236.
- (in press). On the spider genus *Liphistius* (Araneae: Mesothelae) in Burma and Thailand. *Zool. Scr.*
- SEDGWICK, W. C., & P. J. SCHWENDINGER, 1990. On a new cave-dwelling *Liphistius* from Thailand (Araneae: Liphistiidae). *Bull. Brit. arachnol. Soc.*, **8**: 109–112.